GEOLOGY OF THE JACKSON SHAFT COAL.

HON. ANDREW ROY, GLEN ROY, O.

Two limestones, the gray and the blue, known in the later state geological reports as the Ferriferous and Lower Mercer, separated from each other by about 130 feet of strata, constitute well known geological horizons in the lower coal measures of Southern Ohio. The gray limestone which is the upper stratum of the two, is capped by a band of iron ore, which for more than half a century has been the mainspring of the charcoal iron industry of the Hanging Rock iron region on both sides of the Ohio river.

In Jackson county, in the townships of Milton, Lick, Coal and others, the horizon of the Wellston coal is due about 260 feet below the gray limestone, and about 130 feet below the blue. Thin seams of coal never rising to workable height are met between the two limestones, and between the Wellston coal and the blue limestone. About midway also between the Wellston and Jackson coals a thin bed comes in the scale.

A vertical section from the gray limestone to the Jackson coal would be difficult if not impossible to obtain, as there is not only no known point in the strata in the Jackson field where the coal has been met directly beneath the limestone, but it is very doubtful if it exists beneath this limestone. There are, however, numerous vertical sections given in the geological reports of the intervals separating the gray and blue limestone, and the blue limestone and Wellston coal. A section between the Wellston and Jackson coal, furnished further on, places these coals 135 feet to 175 feet apart. From the gray lime to the Jackson coal, these intervals, as I have measured them, are as follows:

From gray to blue limestone.....	130 ft.
From blue limestone to Wellston coal....	130 ft.
From Wellston to Jackson coal....135 to	175 ft.
Total	435 ft.

There is a play of variation of 20 feet from the Wellston coal to the blue limestone in some parts of the Wellston belt,

and also some converging and diverging of the strata separating the two limestones, but they are generally very slight.

The distance which is here given as separating the Jackson and Wellston coals—135 to 175 feet—does not harmonize with the published sections of the State Geological Reports. In volume V, page 1,010, Dr. Orton states the interval between these coals to be presumably 75 to 100 feet.

There are several shafts sunk to the Jackson coal within the corporate limits of Jackson, but none of them are opened on ground high enough to hold the Wellston coal. The hills both north and south of Jackson, however, are high enough, and the coal is met in places in these hills. On the McKitterick farm, three-fourths of a mile north of Jackson, the Wellston coal has been opened for many years. About the same distance south of Jackson, the Wellston coal is also opened on the McClung lands. A horizontal line, prolonged from the McKitterick to the McClung mine, strikes the dome of the Jackson court house 175 feet above the Jackson Shaft Coal, in the swamps, or lowest places in the mines. The levels were carefully made with engineer's levels, and there can be no question as to the intervals separating these coals at Jackson Court House—the only place in the county where a vertical section can be had at all.

An excellent section from the gray limestone to the probable horizon of the Jackson coal was furnished by a drill hole, cut with the diamond drill under my direction a few years ago, in Milton township on the Latrobe furnace lands. The hole was located about midway between the village of Berlin and the Latrobe furnace, and was commenced 70 feet below the gray limestone. It was sunk to a depth of 384 feet below the gray limestone, and 254 feet below the blue, the gray and the blue being exactly 130 feet apart. Alternating layers of sandstone, blue and gray shale, with an occasional deposit of fireclay, were met to a depth of 371 feet below the gray limestone. Here a layer of black shale five feet thick was encountered, which probably represented the horizon of the Jackson shaft coal. A few feet below this shale, the drill ran into the conglomerated rock, which contained very hard cherty pebbles where the hole was stopped. A thin vein of coal was met 70 feet below the blue limestone, which I regarded as too near that formation to represent the Wellston coal. The lowermost bed of fireclay was met 300 feet below the gray limestone under a stratum of dark shale, eight feet in thickness.

If the five feet of black shale, met in the drill hole at a depth of 371 feet below the gray limestone, was on the horizon

of the Jackson coal, there would be a convergence of 64 feet from the swamps, and 24 feet from the hills of the Jackson mines to the drill hole. The line of direction is on the line of strike of the strata, or nearly so; the distance is about seven miles.

The Huron shaft at Jackson, is the deepest of the series of mines opened on the shaft coal. In this shaft, which is ninety feet deep, there is a vein of coal 12 to 15 inches thick, 75 feet above the lower coal. The vein lies about midway between the Jackson and Wellston coals. None of the other Jackson shafts hold this middle vein because it overshoots their tops. It may have been mistaken by the geologists, who find the Wellston and Jackson coals 75 to 100 feet apart, for the shaft coal.

The Jackson deposit of the shaft coal is the only known basin in southern Ohio. It rises above water level a mile west of Jackson; extends into Liberty township until it overshoots the hills and is lost in air. It gradually grows thinner along its western line of outcrop, but improves in quality. Two miles east of Jackson, it becomes too impure for commercial purposes. It is about eight miles in length. Its width has not so far been demonstrated, but is somewhere near three miles.

Two miles north of Coalton, at the Glen Nell Mines, there are two beds of coal met in the same hill, separated by 70 feet of strata. The upper seam is the Wellston coal, thinned down to two feet along its western line of outcrop. The lower seam has been regarded by some as the Wellston coal; by others as the Jackson coal. It is neither. It is the equivalent of the 15-inch coal met in the Huron shaft of Jackson, seventy-five feet above the shaft coal, enlarged to three feet. It is of superior quality to the Jackson vein, but not equal to the Wellston, although it has been mined and sold as Wellston coal. It is sandwiched in a long and narrow basin, of the conglomerate rocks, formed by erosion, anterior to the accumulation of the carbonaceous matter which subsequently became the coal. The Conglomerate rises to within forty or fifty feet of the Wellston coal in this vicinity.

The trough in which the Jackson coal is found was formed by erosion before the dawn of the coal-bearing epoch. The bottom of this basin had a very uneven surface, as is shown by the hollows and hills encountered in the mines, some of the hills rising to a height of forty feet. Over this irregular surface, profuse and luxurious vegetation took root and grew, consisting of various plants differing in size from small mosses to stately trees, which year after year dropped their leaves and fruit and in time died themselves, to be replaced by new growth and

decay until a mingled mass of vegetable tissue was formed like the pulpy mass of a modern peat bog, forty to sixty feet in thickness. At length through the agency of subterranean forces, the land slowly and gradually sank, and in the submergence the weight of the beds of sand and gravel which were washed over the coal marsh, compressed the peaty tissue into its present hard and compact condition. The gravel beds washed over the coal marsh now constitute the conglomerate rock we find overlying the coal.

The trough holding the Jackson coal seems to have been the only one formed in southern Ohio.

The coal of the Mahoning and Tuscarawas valley of Ohio, and the Sharon coal of Pennsylvania, belong to the same horizon as the Jackson coal. In all these districts the coal is met in troughs or swamps eroded in the upper surface of the Cuyahoga shale.

Seventy-five feet above the Jackson shaft coal, a second coal marsh was formed, which is represented in the fifteen-inch vein of the Huron shaft.

The Jackson coal has so far, never been met perpendicularly below the Wellston vein, but there is good reason to believe that the vein extends up Horse Creek to the McKitterick farm, and reaches out to the south on the Mabee road as far as the McClung lands, where at both of these points the Wellston coal is mined for the local supply of Jackson and the surrounding country. This would give the Jackson coal a breadth of three miles, which is about the width of the Wellston belt.

Outside of the Jackson and Wellston fields, at Hamden and McArthur Junction and at McArthur town and other points in Vinton county, the Cuyahoga shale is met seventy-five to ninety feet below the blue limestone and about two hundred feet to two hundred and twenty-five feet below the gray. A thin seam of coal four to twelve inches in thickness is generally met on this horizon. Where it is absent it is on the ridges of the uneven Cuyahoga floor which rises, forming hills fifteen to twenty feet in height, upon which the coal vegetation never grew.

This is the representative of the Wellston coal found in Washington township in Jackson county, and in Richland, Elk and adjoining townships in Vinton county. Whenever the coal is met in measurable thickness, as at the Elco mines and the Vinton Furnace Shaft, it is formed fully forty feet lower in troughs or basins carved out of the Cuyahoga shale, as the Wellston basin was formed.

It was my intention in commencing this paper to include

a description of the structure and area of the Wellston belt, but this would exceed the limit of this paper and weary the Institute. The Wellston coal will however form a subject of a subsequent article.

On motion a vote of thanks was extended to Mr. Roy for his paper.

PRESIDENT RAY: That completes our program. Next in order will be the election of officers.

MR. COXE: There was considerable discussion brought out this morning in relation to fire damp and black damp. I move that Professor Lord be requested to prepare and present at the next annual meeting a paper on this subject, fire damp and black damp.

PROFESSOR LORD: You are forgetting something. Dr. Orton has already exhausted that subject. Dr. Orton's report covers that subject as fully as anything ever has or can be written.

PRESIDENT RAY: I think the gentleman has in mind something similar to your lectures to the students that were illustrated with the gases themselves, as I understand.

The Committee on Nominations will now report.

MR. LLWELLYN: The Committee on Nominations respectfully recommend the following gentlemen for active service during the coming year: For President, Professor Ray; for Vice-President, Mr. Hanlon; for Executive Committee, Professor Lord, Mr. Jennings, Captain J. L. Morris.

Upon motion of Mr. Price, report of committee was accepted and committee discharged.

Upon motion, rules were suspended and Secretary instructed to cast the ballot of the Institute for the members named in committee's report for officers for ensuing year.

Ballot so cast by Secretary and following named officers declared elected:

President, Prof. Frank Ray, Columbus.

Vice-President, Wm. B. Hanlon, Cleveland.

Secretary-Treasurer, R. M. Haseltine, Columbus.

Executive Committee, Prof N. W. Lord, Columbus; W. H. Jennings, Columbus; Captain J. L. Morris, Carrollton.

SECRETARY HASELTINE: I wish to submit the names of several gentlemen who have petitioned for membership in the Institute, as follows:

Thos. M. Davidson.....Wellston, O.
Robert Stalter.....Nelsonville, O.
W. E. Hamilton.....Zanesville, O.
J. B. Hamilton.....Columbus, O.
Howard S. Johnson.....Columbus, O.
Samuel Raybould.....Nelsonville, O.
Wm. Ralston.....Newman, O.
Edward H. Coxe.....Corning, O.
Thos. J. Morgan.....Wellston, O.
Myron J. Hollinger.....Jackson, O.
Wm. K. Moore.....North Lawrence, O.
Lyman D. Howard.....Columbus, O.
Frank N. Slade.....Columbus, O.
Robert S. Paul.....Akron, O.
Wm. Clifford.....Pittsburg, Pa.
H. B. Dierdoff.....Columbus, O.
George Hale.....Ladd, Ill.
John Shultz.....Oliver, Pa.
Albert J. Williams.....Oliver, Pa.
George Harrison.....Wellston, O.
Chas. J. Norwood.....Dahlonega, Ga.
J. W. Jones.....Gallipolis, O.
George E. Hayward.....New Philadelphia, O.
Daniel McBride.....Glouster, O.
Lewis Jones.....Glouster, O.
Theo. S. Huntington.....Columbus, O.
C. C. Sharp.....Corning, O.
George Gorden.....Cleveland, O.
J. J. Roby.....Dillonville, O.
John Pancheon.....Mineral Point, O.
C. B. Hodges.....Pittsburg, Pa.
C. K. Davis.....Glen Roy, O.
Wm. Raybould.....Nelsonville, O.
Wm. Hanson.....Crescent, O.
T. H. Huddy.....Columbus, O.

The above named gentlemen were duly elected to membership in the Institute.

PRESIDENT RAY: We will hear the report of the Committe on Wastage of Coal.

MR. JENNINGS: Some further work has been done. The committee met here and agreed on a plan to turn over to the member of the Institute who is a member of the legislature, a member of the Finance Committee of the House, the execution of the plans suggested, and the work is as good as done. (Applause.)

PRESIDENT RAY: We resolved ourselves into a committee of one to think about a plan for the publication of the Journal. Are there any further suggestions in that line?

We have completed the work of our session, and for my own part, I feel that it has been one of the most prosperous, one of the most instructive and pleasant meetings. The papers have been of an exceptionally high grade, and I feel proud to be connected with an Institute capable of producing such papers as we have listened to.

I appreciate the honor of being re-elected to the Presidency of the Institute and assure you that I will try to do the utmost in my power for the work of the Institute. I urge upon each member to go home with the intention of not putting off the selection of his subject for the next meeting, until a few weeks before that time, but to select a topic right away and begin collecting material for his paper, and thus endeavor to make the next meeting superior even to this. Let us keep the good work going and our influence will be felt throughout the state in a good Journal which we can be proud of.

I thank you for the privilege of saying these few words. (Applause.)

MR. OYSER: I want to bring to your attention an old electric machine which has figured in coal mine operations of Ohio ever since the first inception of coal mining by electricity. Prior to that, I believe this machine came from the Philadelphia Centennial. I can trace it to within a very short time of that. It is a dynamo of the German type. It is of the old Weston

type, somewhat. The dynamo first operated the street railway plant on the lake front at Chicago, during the first exposition held at Chicago after the Centennial at Philadelphia, before there were any railways of the electric type in Chicago. There was one at the time at Richmond, Va. It was then taken to Newark, Ohio, to run as excitor a Vanderpool type dynamo. This is the little dynamo that squatted down on the floor and acted as excitor to that machine. Then there were no machines to determine the volts and amperes; we had to guess at it.

To me this little machine is dear as a relic. I set the machine up at Chicago on the lake front the first time it was used. Then I was surprised when I came to Iron Point Mines to put up mining plant to find the dynamo there. A few days ago I dropped into an isloated shop in this city and found my old friend, the little dynamo, scattered all over the floor. From the fact that it operated the first electric mining plant in Ohio and about the second one in the United States, it seems that the Ohio Institute, or School of Mines at the O. S. U. should own it. The price, I think, would be small. I did not learn exactly who it belongs to, but can get the information.

I move that the Chair appoint a committee to investigate the matter and confer with the School of Mines at the University in reference to securing this relic.

Motion seconded by Mr. Haseltine. Carried.

Committee appointed by the Chair as follows: Messrs. Haseltine, Oyser and Jennings.

PRESIDENT RAY: Is there any further business?

SECRETARY HASELTINE: I move you that we proceed to the special order of business, the report from our Poet Laureate, Captain Morris.

CAPTAIN MORRIS: Ladies and Gentltmen—This is a little of our experience while on our summer outing.

Following read by Captain Morris: